


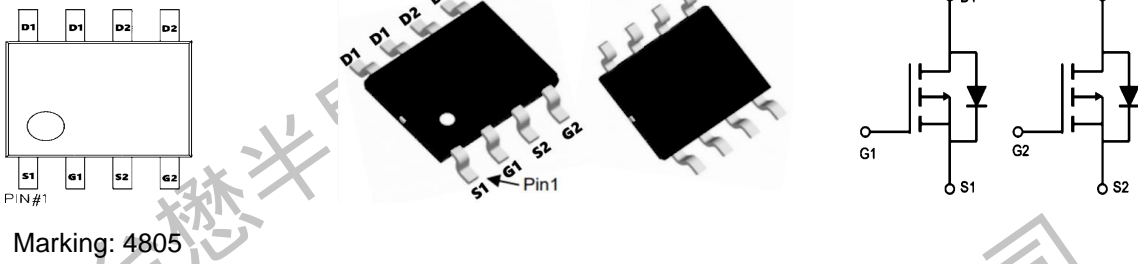


# TM09V03S

## P+P-Channel Enhancement Mode Mosfet

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = -30V</math> <math>I_D = -9.0A</math>  <math>R_{DS(ON)} = 18m\Omega</math>(typ.)@ <math>V_{GS} = -10V</math></p> <p>100% UIS Tested          100% <math>R_g</math> Tested</p> 
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S:SOP-8L



Marking: 4805

**Absolute Maximum Ratings** ( $T_A = 25^\circ C$  unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	- 30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $-V_{GS} @ -10V^1$	-9	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $-V_{GS} @ -10V^1$	-5.9	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-36	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>note2</sup>	25	mJ
$P_D @ T_A = 25^\circ C$	Total Power Dissipation <sup>3</sup>	3.3	W
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 175	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	85	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	36	$^\circ C/W$



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### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.022	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A	---	18	24	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A	---	25	37	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250μA	-1.0	-1.5	-2.0	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	4.6	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	-1	μA
		V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	-5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-6A	---	17	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	13	---	Ω
Q <sub>g</sub>	Total Gate Charge (-4.5V)		---	12.6	---	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A	---	4.8	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	4.8	---	
T <sub>d(on)</sub>	Turn-On Delay Time		---	4.6	---	ns
T <sub>r</sub>	Rise Time	V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω,	---	14.8	---	
T <sub>d(off)</sub>	Turn-Off Delay Time	I <sub>D</sub> =-6A	---	41	---	
T <sub>f</sub>	Fall Time		---	19.6	---	
C <sub>iss</sub>	Input Capacitance		---	1345	---	PF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	---	194	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	158	---	

### Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>GS</sub> =V <sub>D</sub> =0V, Force Current	---	---	-9.0	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	-26	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-6A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	16.3	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge		---	5.9	---	nC

Note :

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH, I<sub>AS</sub>=-38A
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

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Typical Performance Characteristics

Figure 1 : Output Characteristics

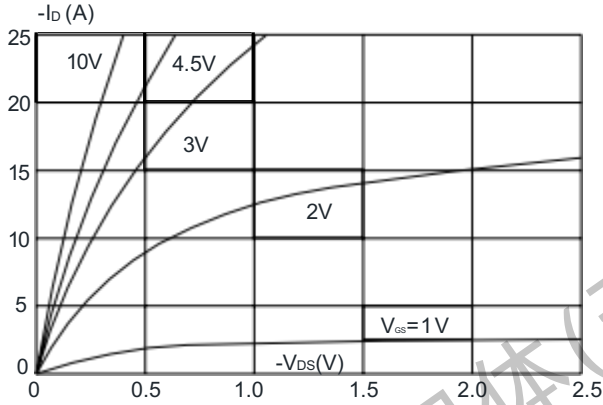


Figure 2 : Typical Transfer Characteristics

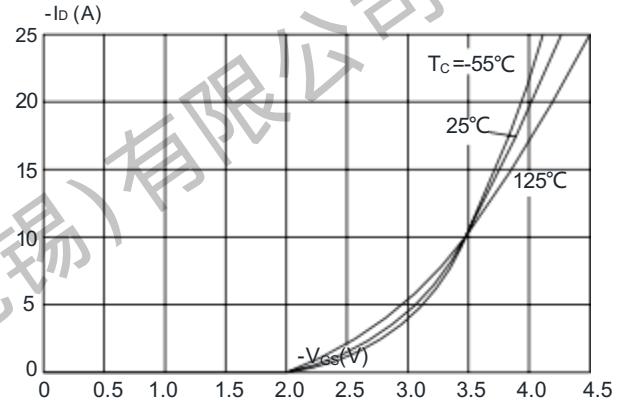


Figure 3: On-resistance vs. Drain Current

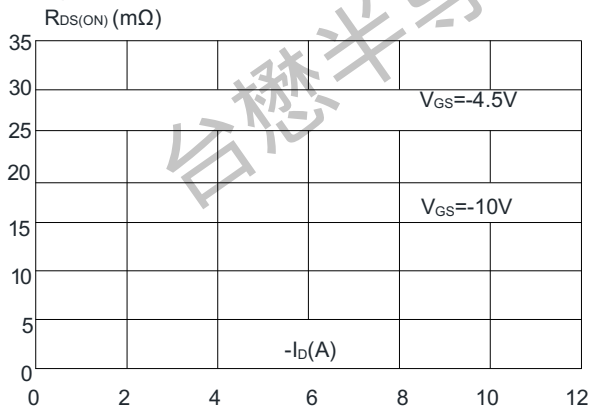


Figure 4 : Body Diode Characteristics

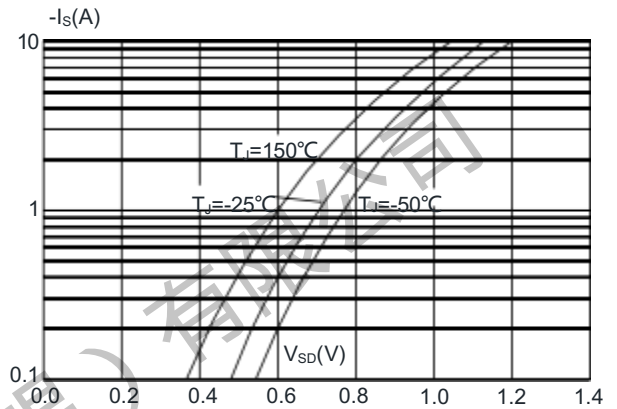


Figure 5: Gate Charge Characteristics

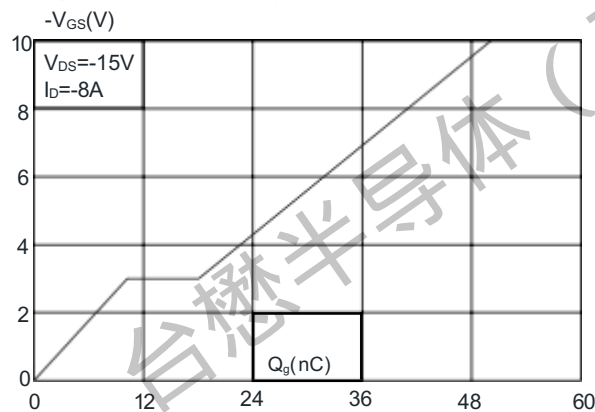
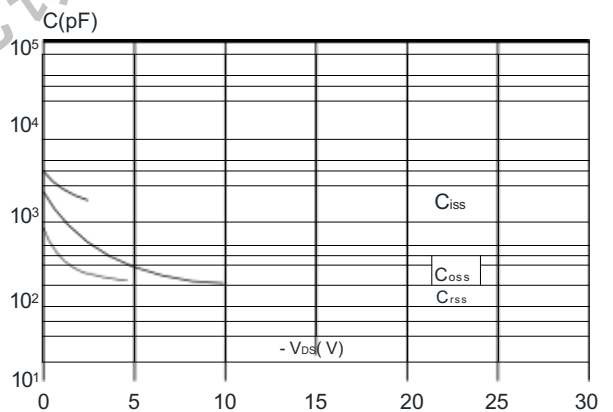


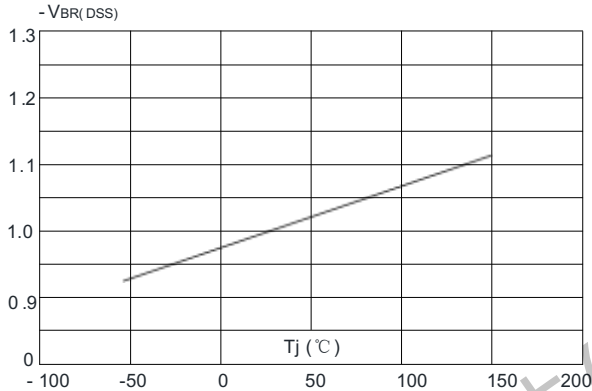
Figure 6: Capacitance Characteristics



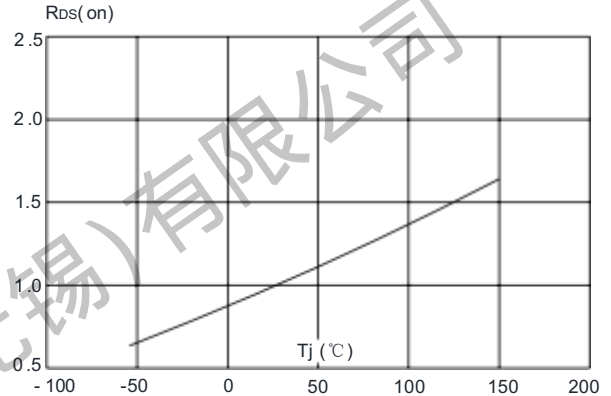
**TM09V03S**

**P+P-Channel Enhancement Mode Mosfet**

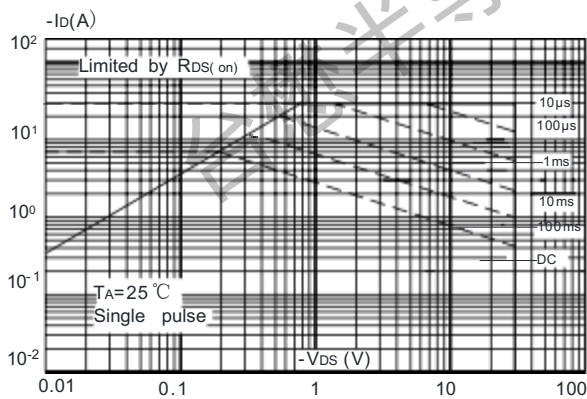
**Figure 7: Normalized Breakdown Voltage vs. Junction Temperature**



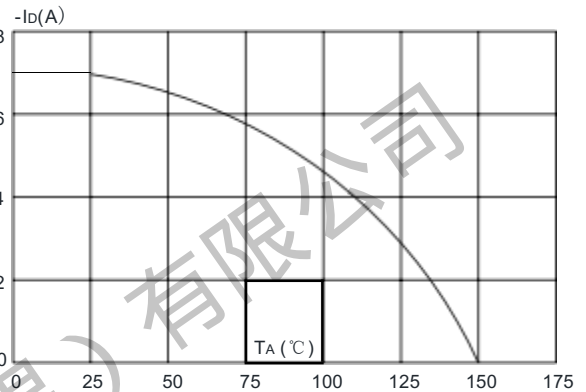
**Figure 8: Normalized on Resistance vs. Junction Temperature**



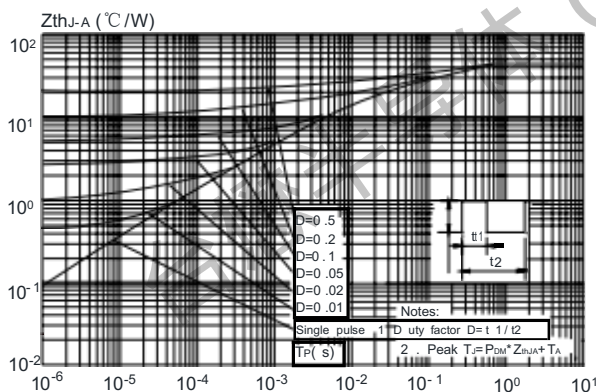
**Figure 9: Maximum Safe Operating Area**



**Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature**



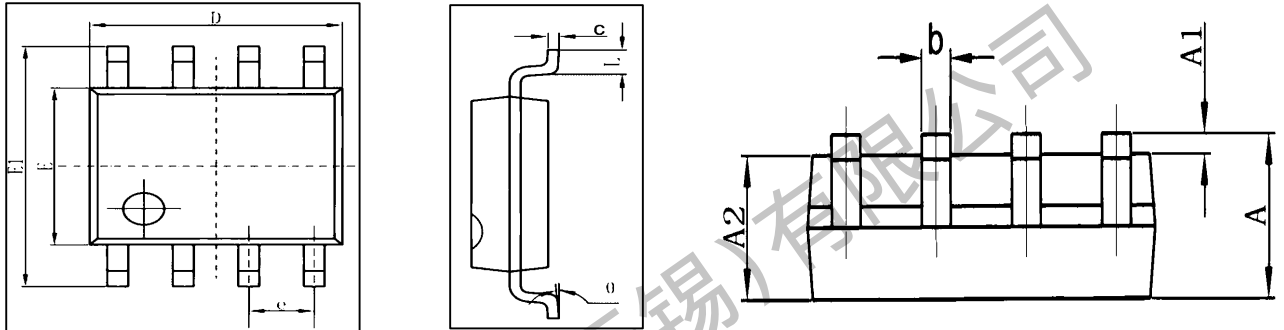
**Maximum Effective Transient Thermal Impedance, Junction-to-Ambient**



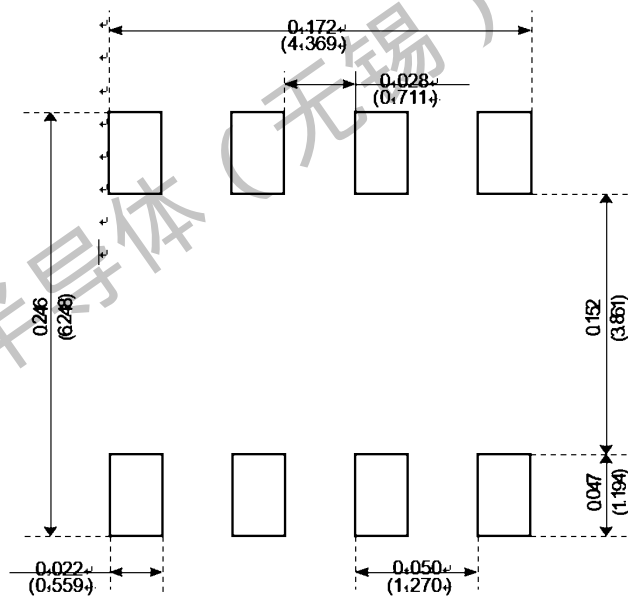
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Package Mechanical Data:SOP-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

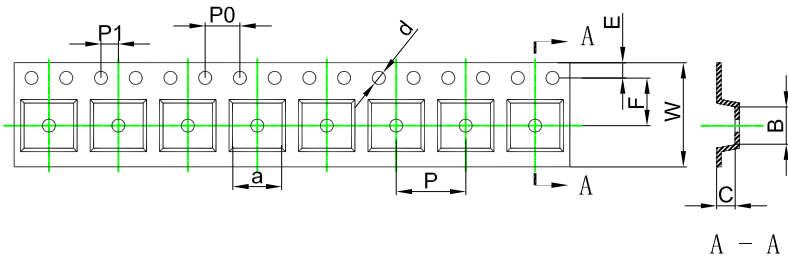


Recommended Minimum Pads

**TM09V03S**

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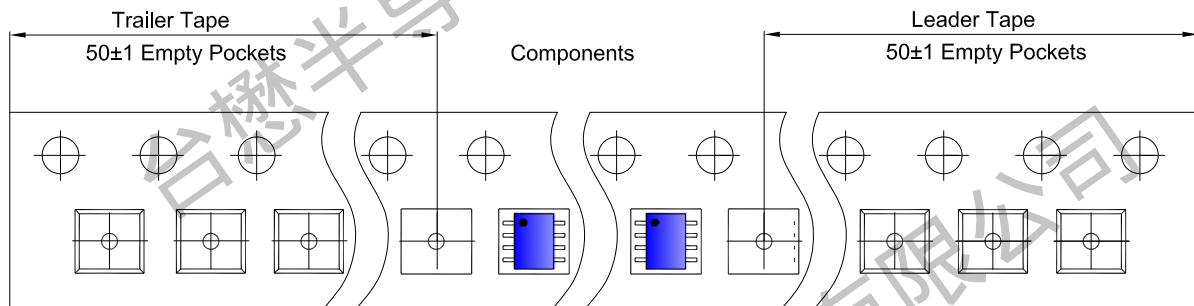
**SOP-8L Embossed Carrier Tape**



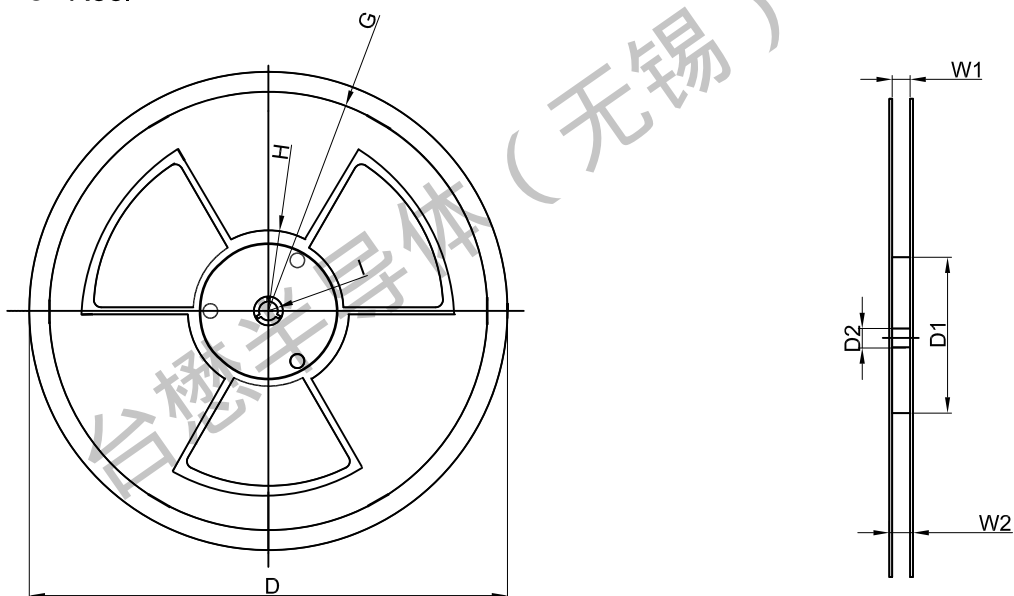
**Packaging Description:**  
SOP-8L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 33cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).  
**ALL DIM IN mm**

Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
SOP-8L	6.40	5.40	2.10	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

**SOP-8L Tape Leader and Trailer**



**SOP-8L Reel**



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
13" Dia	Ø330.00	100.00	13.00	R135.00	R55.00	R6.50	12.00	14.00

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
3,000 pcs	13 inch	6,000 pcs	370×355×52	48,000 pcs	400×360×368	

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Revision history:

Date	Rev	Description	Page
2023.06.23	23.06	Original	